

We claim:

- 1 An optical immersion probe comprising:
 - a) a cylindrical probe tip comprising a cylinder having first and second openings at first and second ends of said cylinder;
 - b) a spherical lens disposed inside said probe tip cylinder and secured at said first opening; and
 - c) a seal between said cylinder and said spherical lens at said first opening.
- 2 The optical immersion probe of claim 1 wherein said seal is chosen from the group consisting of a weld, a braise, and an adhesive.
- 3 The optical immersion probe of claim 2 wherein said seal is a braise.
- 4 The optical immersion probe of claim 1 wherein said cylinder is comprised of a material chosen from the group consisting of metals, alloys, plastics, ceramics, composites, and glass.
5. The optical immersion probe of claim 4 wherein said cylinder is comprised of a metal alloy.
6. The optical immersion probe of claim 1 wherein said spherical lens is comprised of a material chosen from the group consisting of glass, doped glass, sapphire, diamond, ruby, zinc selenide, potassium bromide crystal and sodium chloride crystal.

7. The optical immersion probe of claim 6 wherein said lens is comprised of sapphire.
8. The optical immersion probe of claim 1 further comprising an instrument interface at said second opening of said second end of said cylinder.
9. The optical immersion probe of claim 1 wherein said interior surface at said first opening of said cylindrical probe tip is chosen from the group consisting of a chamfer, a slant, a bevel a round and a square.
10. An optical immersion probe comprising:
 - a) a cylindrical probe tip comprising a cylinder having a first and a second openings at first and second ends, and threads on its interior surface, wherein the diameter of said first opening is less than the inner diameter of the cylinder between said first opening and said second opening;
 - b) a first gasket seated inside said probe tip at said first opening such that the opening of said gasket is aligned with said first opening of said probe tip;
 - c) a spherical lens disposed within said cylindrical probe tip such that it is on top of, in contact with, and centrally aligned with, said gasket;
 - d) a second gasket seated inside said probe tip on top of and in contact with said spherical lens; and

- e) a fastener cylinder having proximal and distal ends and threads on its exterior surface wherein said fastener is threaded into said cylindrical probe tip such that said proximal end contacts said second gasket;
- 11 The optical immersion probe of claim 10 wherein said cylinder is comprised of a material chosen from the group consisting of metals, alloys, plastics, ceramics, composites, and glass.
- 12 The optical immersion probe of claim 11 wherein said cylinder is comprised of a metal alloy.
13. The optical immersion probe of claim 11 wherein said spherical lens is comprised of a material chosen from the group consisting of glass, doped glass, sapphire, diamond, ruby, zinc selenide, potassium bromide crystal and sodium chloride crystal.
- 14 The optical immersion probe of claim 13 wherein said lens is comprised of sapphire.
- 15 The optical immersion probe of claim 10 further comprising an instrument interface at said second end of said cylindrical probe tip.
16. The optical immersion probe of claim 10 further comprising a probe tube having first and second ends and threads disposed on said first end, wherein said probe tube is threaded into said cylindrical probe tip.

17. The optical immersion probe of claim 16 further comprising a seal between said cylindrical probe tip and said probe tube.
18. The optical immersion probe of claim 17 further comprising and instrument interface at said second end of said probe tube.
19. The optical immersion probe of claim 18 wherein said seal is chosen from the group consisting of a weld, a braise, adhesive, and a gasket.
20. The optical immersion probe of claim 19 wherein said seal is a gasket.
21. The optical immersion probe of claim 20 wherein said seal is an o-ring.
22. The optical immersion probe of claim 16 wherein said interior surface at said first opening of said cylindrical probe tip is chosen from the group consisting of a chamfer, a slant, a bevel a round and a square.
23. The optical immersion probe of claim 16 wherein the shape of said fastener cylinder at its proximal end is a chamfer, a bevel, a slant, a round or a square.
24. The optical immersion probe of claim 10 wherein said fastener further comprises two notches cut into said second end such that said notches are on opposite sides of said fastener cylinder.

25. The optical immersion probe of claim 10 wherein said gasket is an o-ring.
26. An optical immersion probe comprising:
- a) a cylindrical probe tip having a first and a second opening at first and second ends, and threads on its interior surface, wherein the diameter of said first opening is less than the inner diameter of the cylinder;
 - b) a first gasket seated inside said probe tip at said first opening such that the opening of said gasket is aligned with said first opening of said probe tip;
 - c) a spherical lens disposed within said probe tip such that it is on top of, in contact with, and centrally aligned with, said gasket;
 - d) a second gasket seated inside said probe tip on top of and in contact with said spherical lens;
 - e) a fastener cylinder having proximal and distal ends and threads on its exterior surface wherein said fastener is threaded into said cylindrical probe tip such that said proximal end contacts said second gasket; and
 - f) a probe tube having first and second ends and threads disposed on said first end, wherein said threads are mated with the threads on said interior surface of said cylindrical probe tip.
27. The optical immersion probe of claim 26 wherein said spherical lens is comprised of a material chosen from the group consisting of glass, doped glass, sapphire, diamond, ruby, zinc selenide, potassium bromide crystal and sodium chloride crystal.

28. The optical immersion probe of claim 26 further comprising a seal between said cylindrical probe tip and said probe tube.
29. The optical immersion probe of claim 28 wherein said seal is chosen from the group consisting of a weld, a braise, adhesive, or a gasket.
30. The optical immersion probe of claim 29 wherein said seal is a gasket.
31. The optical immersion probe of claim 29 wherein said seal is an o-ring.
32. The optical immersion probe of claim 26 further comprising and instrument interface at said second end of said probe tube.
33. The optical immersion probe of claim 26 wherein said interior surface at said first opening of said cylindrical probe tip is chosen from the group consisting of a chamfer, a slant, a bevel a round and a square.
34. The optical immersion probe of claim 26 wherein the shape of said fastener cylinder at its proximal end is a chamfer, a bevel, a slant, a round or a square.
35. The method of claim 26 wherein said fastener further comprises two notches cut into said second end such that said notches are on opposite sides of said fastener cylinder.
36. The optical immersion probe of claim 30 wherein said seal is an o-ring.

37. An optical immersion probe comprising:
- a) a cylindrical probe tip having a first and a second openings at first and second ends, and threads on its interior surface, wherein said probe tip is chamfered on its interior surface at said first opening such that the inner diameter at said first opening is less than the inner diameter of the cylinder;
 - b) a first o-ring seated inside said probe tip at said first opening such that the opening of said gasket is aligned with said first opening of said probe tip;
 - c) a spherical lens disposed within said probe tip such that it is seated on top of, and centrally aligned with, said o-ring;
 - d) a second o-ring seated inside of said probe tip on top of said spherical lens;
 - e) a fastener cylinder having proximal and distal ends and threads on its exterior surface, wherein said fastener cylinder is chamfered inward at said proximal end, said fastener is threaded into said probe tip such that said proximal end contacts said second gasket;
 - f) a probe tube having first and second ends and threads disposed on said first end, wherein said probe tube is threaded into said cylindrical probe tip; and
 - g) an o-ring seated between said probe tube and said cylindrical probe tip.
38. The optical immersion probe of claim 37 wherein said cylinder is comprised of a material chosen from the group consisting of metals, alloys, plastics, ceramics, composites, and glass.

39. The optical immersion probe of claim 36 wherein said cylinder is comprised of a metal alloy.
40. The optical immersion probe of claim 36 wherein said spherical lens is comprised of a material chosen from the group consisting of glass, doped glass, sapphire, diamond, ruby, zinc selenide, potassium bromide crystal and sodium chloride crystal.
41. The optical immersion probe of claim 40 wherein said lens is comprised of sapphire.
42. The optical immersion probe of claim 37 further comprising an instrument interface at said second end of said cylindrical probe tube.
43. The optical immersion probe of claim 37 wherein said fastener further comprises two notches cut into said second end such that said notches are on opposite sides of said fastener cylinder.